

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	Manual No.: 5-21000-OPS-FO
	New Manual No.: 4-11000-ER-OPS-FO
EMD OPERATING PROCEDURES MANUAL	Procedure No.: Table of Contents, Rev 76
VOL I: FIELD OPERATIONS	Page: 1 of 3
	Effective Date: 11/23/94
	Organization: Environmental Management

THIS IS ONE VOLUME OF A SIX VOLUME SET WHICH INCLUDES:

VOLUME I: FIELD OPERATIONS (FO)
VOLUME II: GROUNDWATER (GW)
VOLUME III: GEOTECHNICAL (GT)
VOLUME IV: SURFACE WATER (SW)
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94-DMR-001010	LIMITED SCOPE - Section FO.03 Text Modification	2	06/01/94
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94-DMR-001009	LIMITED SCOPE - Section FO.04 Text Modification	2	06/01/94
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94-DMR-001175	LIMITED SCOPE - Decontamination Water Disposal Location Changes	2	06/20/94
FO.08	Handling of Drilling Fluids and Cuttings	2	05/12/92
94-DMR-001650	Procedural Clarifications	2	09/27/94

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FO.10	Receiving, Labeling, and Handling Environmental Materials Containers	2	05/12/92
93-DMR-000677	DMR	2	11/01/93
94-DMR-000244	Drying Agent Modification	2	03/14/94
94-DMR-000558	Form Modification	2	04/15/94
94-DMR-001649	Deletion of Text Addressed in FO.08	2	09/27/94
FO.11	Field Communications	2	05/12/92
FO.12	Decontamination Facility Operations	2	05/12/92
FO.13	Containerization, Preserving, Handling and Shipping of Soil and Water Samples	2	05/12/92
93-DMR-000530	Section FO.13 Modification	2	11/04/93
93-DMR-000667	Section FO.13 Modification	2	11/20/93
94-DMR-000143	Composite Sampling Clarification	2	02/11/94
94-DMR-001670	New Statement of Work	2	09/15/94
FO.14	4-B29-ER-OPS-FO.14 - Field Data Management	3	09/09/94
FO.15	Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs)	2	05/12/92
FO.16	Field Radiological Measurements	2	05/12/92
FO.18	Environmental Sample Radioactivity Content Screening	1	05/12/92
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FO. 23	4-F99-OPS-FO.23 - Management of Soil and Sediment Investigative Derived Materials (IDM)	0	01/11/94
94-DMR-000137	Training Requirements Clarification	0	01/28/94
94-DMR-000148	Section FO.23 Modifications	0	02/09/94
94-DMR-001108	Buried Instrumentation and Existing Soil	0	06/14/94
94-DMR-001350	Various Text Additions and Deletions Regarding Drums and Use of SOP FO.29	0	08/16/94

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FO.25	4-B11-ER-OPS-FO.25 - Shipment of Radioactive Materials Samples	0	12/01/93
FO.27	4-BO1-ER-OPS-FO.27 - Collection of Floor/Equipment Hot Water Rinsate Samples	0	07/26/93
FO.29	4-H46-ENV-OPS-FO.29 - Disposition of Soil and Sediment Investigation-Derived Materials	0	06/24/94
94-DMR-001226	Allowance of Procedural Use for Waste Piles	0	07/15/94
94-DMR-001741	Permission of Use of Computer-Generated Forms and Other Minor Corrections	0	10/07/94
FO.30	4-I11-ER-OPS-FO.30 - Environmental Restoration Program Division Equipment Operation	0	10/07/94
•FO.31	4-I49-ENV-OPS-FO.31 - Groundwater Recovery/Storage System - Normal Operations OU1, Bldg 891	0	11/23/94
FO.32	4-I50-ENV-OPS-FO.32 - Treated Effluent Discharge OU1, Bldg 891	0	04/13/94
•FO.34	4-I52-ENV-OPS-FO.34 - Ion Exchange System - Normal Operations OU1, Bldg 891	0	11/23/94
FO.35	4-I53-ENV-OPS-FO.35 - Ultraviolet/Hydrogen Peroxide Oxidation System - Normal Operations OU1, Bldg 891	0	11/15/94
•FO.37	4-I55-ENV-OPS-FO.37 - Neutralization Tank - Normal Operations OU1, Bldg 891	0	11/23/94

Rocky Flats Environmental Technology Site

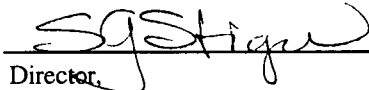
4-I52-ENV-OPS-FO.34

ONLY

REVISION 0

ION EXCHANGE SYSTEM NORMAL OPERATIONS, OPERABLE UNIT 1, BUILDING 891

APPROVED BY:



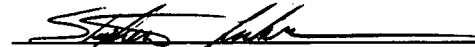
Director,

1 S.G. STICKER 1 10-20-94

Print Name

Date

EG&G Environmental Restoration Program Division



Quality Assurance Manager,

1 STEPHEN LUER 1 10-24-94

Print Name

Date

Data Management and Reporting Services

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Environmental Operations Management
Operable Unit 1 Closure
Industrial Hygiene
Occupational Safety
Radiological Health and Engineering
Surface Water Division

USE CATEGORY 3

ORC review not required

The following have been incorporated in this revision:

94-DMR-000182

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1. PURPOSE

This procedure provides operating instructions for normal treatment operations for the Ion Exchange (IX) System at the Building 891 Groundwater Treatment Facility for 881 Hillside, Operable Unit (OU) 1.

2. SCOPE

This procedure applies to Environmental Operations Management employees and subcontractors.

This procedure addresses the following topics:

- IX normal operations
- Filter bag removal, handling, and replacement

3. OVERVIEW

The Building 891 Groundwater Treatment Facility consists of :

- A groundwater recovery and storage system.
- An ultraviolet/hydrogen peroxide (UV/H₂O₂) oxidation system.
- An ion exchange system with units for acid and caustic regeneration of resin.
- A spent regenerant neutralization system.
- A treated effluent storage and discharge system.

The details of IX System are described below. A diagram of the piping systems is shown in Appendix 1, Groundwater Recovery/Storage Diagram.

Effluent from the UV/H₂O₂ process flows to ion exchange surge Tank T-203. The purpose of the ion exchange surge tank is to receive and store the water until it is pumped out to the ion exchange system. When the ion exchange surge tank has an adequate volume of treated water, the water is pumped to the IX system.

From the ion exchange surge tank T-203, the water is pumped by Pump P-1 to two IX Columns, IX-1 and IX-2, in series. Column IX-1 removes radionuclides, primarily uranium. Column IX-1 contains a strong base anion resin in the chloride form (IONAC A-641). Column IX-1 is not regenerated, but is bump rinsed once for every five system regeneration cycles. Column IX-2 contains a resin for alkalinity and heavy metals. Column IX-2 has a weak acid cation resin in hydrogen form (IONAC CC) that removes positively charged cations associated with alkalinity in water. Column IX-2 is regenerated with hydrochloric acid in accordance with 4-I54-ENV-OPS-FO.36, Ion Exchange System Regeneration Operations, Operable Unit 1, Building 891.

3. OVERVIEW (continued)

The groundwater flows from Column IX-2 to a degasifier, Tank T-100 where liberated carbon dioxide escapes to the atmosphere. From the degasifier, the water is pumped by Pump P-2 to the final two ion exchange columns, IX-3 and IX-4, for removal of total dissolved solids. Column IX-3 contains a strong acid cation resin (IONAC C-267) that removes remaining positively charged cations including excess hardness and metals. Column IX-4 contains a weak base anion resin (IONAC AFP-329) that removes excess negatively charged anions. Column IX-3 is regenerated with hydrochloric acid, and Column IX-4 is regenerated with sodium hydroxide; both processes are performed in accordance with 4-I54-ENV-OPS-FO.36.

The treated groundwater exits the building and flows to one of the following treated effluent storage tanks:

- T-205
- T-206
- T-207

The groundwater is held in the tanks until analytical tests confirm that it is suitable for discharge to the south interceptor ditch in accordance with 4-I50-ENV-OPS-FO.32, Treated Effluent Discharge, Operable Unit 1, Building 891. In order to be suitable for discharge, the groundwater is analyzed to ensure that it meets the OU 1 Building 891 Applicable or Relevant and Appropriate Requirements (ARARs) as shown in Appendix 2, ARAR Limits.

Each subsection of the major Instructions section is a stand-alone section and may be performed independently of other subsections.

4. RESPONSIBILITIES

4.1 Operator

Operates the IX System in Building 891.

4.2 Project Manager

Ensures that Operators are qualified to do the work.

Ensures that Operators are properly trained, and that the training is documented.

Ensures that project records are handled appropriately.

5. LIMITATIONS AND PRECAUTIONS

- The tanks and ion exchange vessels associated with the IX system are confined spaces. Any entry to the tanks or vessels shall be in accordance with EG&G procedures and the Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan.

6. PREREQUISITE ACTIONS

6.1 Planning and Coordination

Project Manager

- [1] Ensure that all personnel performing these procedures have the appropriate health and safety training as specified in the Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan.
- [2] Document personnel qualifications related to this procedure in the project files in accordance with 2-F94-ER-ADM-02.01, Personnel Training and Qualification.
- [3] Ensure that project records are handled appropriately.

6.2 Materials and Equipment

- Bar, steel, for loosening or tightening wing nuts on filter housings
- Filter Bag

7. INSTRUCTIONS

A Bruner IX Treatment Unit is installed to remove radioactive and inorganic materials in the 881 Hillside OU1 groundwater. The Bruner IX Treatment Unit is designed to treat the effluent from the UV/H₂O₂ oxidation process at a constant preset rate of 30 gpm. Alternatively, the IX System can also be used to treat water that is returned from the following treated effluent storage tanks for additional treatment:

- T-205
- T-206
- T-207

Effluent from the IX System is normally routed to the 150,000-gal treated effluent storage tanks.

Detailed manufacturer information on the Bruner IX Treatment Unit is available at the Building 891 Groundwater Treatment Facility. A list of system valve designators, nomenclature, and type is provided in Appendix 3, Valves.

7.1 IX System Normal Operations

The following section provides instructions for the automatic operation of treating water from the IX system surge tank.

Operator

[1] Verify that the following valves are CLOSED:

- HV-501, Recirculation to UV
- HV-502, Recirculation to IX
- HV-503, Recirculation

[2] Open HVB-203, IX Feed From T-203.

The valve is at the containment wall between the tank and Building 891.

[3] Verify that the following valves are OPEN:

- V-1, P-1 Service Inlet
- V-2, P-1 Service Outlet
- V-3, Bag Filter Outlet
- V-4, IX-1 Inlet Isolation
- V-5, IX-1 Outlet Isolation
- V-6, IX-2 Inlet Isolation
- V-130, IX-2 Outlet Isolation
- V-7, Isolation
- V-8, Degasifier Inlet Isolation
- V-9, Degasifier Outlet/P-2 Inlet
- V-10, P-2 Outlet

7.1 IX System Normal Operations (continued)

Operator (continued)

- V-11, IX-3 Inlet Isolation
- V-12, IX-3 Outlet Isolation
- V-13, IX-4 Inlet Isolation
- V-131, IX-4 Effluent Isolation

[4] Verify that the following valves are OPEN:

- V-94, IX-4 Effluent
- V-108, Recirculation Isolation
- V-128, Gamma Detection Isolation

These valves are effluent line isolation valves past Column IX-4.

[5] Verify the tank selected for treatment in the following Step has an indicated level less than 12 feet.

[6] Open one of the following manual valves at the inlet to the selected treated effluent storage tank:

- HVA-205, Plant Effluent /T205 Influent
- HVA-206, Plant Effluent/T-206 Influent
- HVA-207, Plant Effluent/T-207 Influent

[7] Verify that the other two tank influent isolation valves are CLOSED.

[8] Place the following switches in AUTO:

- IX feed pump P-1
- Degasifier forwarding pump P-2
- Degasifier blower BLR-1

These switches are at the IX control panel on the east wall of the Control Room in Building 891.

[9] Place the CONTROL I/O POWER switch in ON.

[10] Place the degasifier air preheater HTR-1 and the air scour blower BLR-2 switches in OFF.

[11] Turn on the power to the Bruner IX Treatment Unit panel at breaker UCP-3, ION EXCHANGE TREATMENT UNIT.

Breaker UCP-3 is in the west wall of the Control Room. The IX system valve indicator lights are red, indicating that the valves are CLOSED.

7.1 IX System Normal Operations (continued)

Operator (continued)

NOTE *Pump P-2 cycles on and off during the IX system process in response to the degasifier sump water level controller.*

- [12] Place the IX-Auto /Off switch in AUTO to begin system operation.

The switch is under the Allen-Bradley touch screen on the Main Control Panel in the center of the Control Room.

- [13] Verify that the handswitch is OFF.

- [14] Verify that Pump P-1 is running.

The green light on the UCP3 Ion Exchange Panel is lighted, and the pump is audible. The UCP3 Ion Exchange Panel is on the east wall of the Control Room.

- [15] Verify that the following valves indicate OPEN on the UCP3 Ion Exchange Panel for normal treatment operations:

- FV-1A, IX-1 Service Inlet
- FV-1B, IX-1 Outlet/IX-2 Service Inlet
- FV-4, IX-2 Outlet
- FV-1C, IX-2 Service Outlet/IX-3 Service Inlet
- FV-1D, IX-3 Service Outlet/IX-4 Service Inlet
- FV-4D, IX-4 Service Outlet
- FCV-1, Fail Close Plant Effluent
- FCV-2, Fail Close Recycle

A green light indicates that the valves are OPEN.

- [16] Verify that the degasifier blower BLR-1 indicates running.

A green light is lighted for BLR-1, and the blower is audible.

- [17] Verify by system walkdown that the following valves are OPEN:

- FV-1A
- FV-1B
- FV-4
- FV-1C
- FV-1D
- FV-4D
- FCV-1
- FCV-2

7.1 IX System Normal Operations (continued)

Operator (continued)

[18] Monitor the IX System hourly by using Appendix 4 Building 891 IX Treatment Log.

[19] **IF** an alarm occurs on the IX Control Panel,
THEN check system status and notify the project manager.

The system automatically shuts down on the following conditions:

- Overpressure on P-1, P-2, P-3
- Low Flow on P-1, P-2, P-3
- Flow Failure on BLR-1, BLR-2
- Degassifier High Sump Level
- Degassifier Low Sump Level
- Degassifier Air Temperature
- High Differential Pressure on BLF-1, BLF-2
- High Differential Pressure on IX-1, IX-2, IX-3, IX-4
- Motorized Valve Failure

[20] **WHEN** the IX System process is finished,
THEN:

[A] Place the IX Auto switch under the touch screen in OFF.

[B] Place the UCP-3 ION EXCH PANEL CONTROL I/O POWER switch in OFF.

[21] Close HVB-203.

[22] Close the appropriate valve to the selected effluent treatment tank:

- HVA-205
- HVA-206
- HVA-207

[23] Record all activities in the Building 891 IX Treatment Log in accordance with 2-G18-ER-ADM-17.01, Records Capture and Transmittal including:

- Date.
- Time.
- Activity.

7.2 Filter Bag Removal, Handling, and Replacement

The IX System includes two bag filter housings, BLF-1 and BLF-2. The filter bags remove suspended solids that may be present in the influent water to the first IX column (IX-1) and the recycled backwash water. The filter bags are removed and replaced, as necessary, when the differential pressure exceeds 12 psid. Each IX Column and bag filter is equipped with a locally mounted differential pressure gauge. An hourly check of the differential pressure gauges is conducted during operation. An automatic shutdown of the IX System occurs when the differential pressure reaches 12 psid.

NOTE *Removal and handling of filter bags and any spillage is performed with the appropriate personal protective equipment (PPE) and monitoring in accordance with the Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan.*

Operator

- [1] **IF** an automatic shutdown of the IX System occurs when the differential pressure reaches 12 psid,
THEN close the inlet and outlet valves at the filter in service:
 - [A] For Filter BLF-1, close valves V-2, P-1 Service Outlet and V-3, Bag Filter Outlet.
 - [B] For Filter BLF-2, close valves V-21, Bag Filter #2 Inlet and V-22, Bag Filter #2 Outlet.
- [2] Don PPE consistent with the requirements of the Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan.
- [3] Slowly turn each of the three wing nuts on the filter top one turn each to relieve residual pressure.

A bar is provided for loosening the wingnuts.
- [4] Remove each wing nut.
- [5] Open the filter lid and remove.
- [6] Lift the stainless steel basket holding the filter bag straight up, and allow the water to drain out.
- [7] **WHEN** the water has drained from the filter bag,
THEN:
 - [A] Grasp the fabric strap at the top of the filter bag.

7.2 Filter Bag Removal, Handling, and Replacement (continued)

Operator (continued)

- [B] Lift the filter bag from the basket.
- [8] Suspend the filter bag over the filter housing or over a bucket, and allow the filter bag to completely dry.
- [9] Verify the size of the filter required, and obtain a new filter bag from the box of filters in the storage area.
- [10] Insert the new filter bag into the basket, and ensure that the filter bag conforms completely to the basket contours.

The top of the bag will fit securely in the top of the basket if placed correctly.
- [11] Install the basket in the filter.
- [12] Install the lid on the filter, and securely tighten the wing nuts.
- [13] Open the following inlet and outlet valves:
 - [A] For Filter BLF-1, open Valves V-2 and V-3.
 - [B] For Filter BLF-2, open Valves V-21 and V-22.
- [14] Return the IX System to service by pressing the ALARM SILENCE pushbutton on the UCP3 Ion Exchange Panel for 15 seconds.
- [15] Dispose of dry filter bag in accordance with the OU-1 Waste Stream Residue Identification and Characterization book.
- [16] Record all activities in the Building 891 Daily Log in accordance with 2-G18-ER-ADM-17.01, Records Capture and Transmittal including:
 - Date.
 - Time.
 - Activity.

8. RECORDS

Management of all records is consistent with 1-77000-RM-001, Records Management Guidance for Records Sources.

Project Manager

- [1] Ensure that the original and one copy of the Daily Log are transmitted to the ERPD Project File Center in accordance with 2-G18-ER-ADM-17.01, Records Capture and transmittal.

Submission of record copies to the ERPD File Center satisfies Administrative Record requirements as defined in 3-21000-ADM-17.02, Administrative Records Screening and Processing.

There are no nonquality records generated by this procedure.

9. REFERENCES

OU-1 Waste Stream Residue Identification and Characterization

Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan

1-77000-RM-001, Records Management Guidance for Records Sources

2-11000-ER-ADM-02.01, Training

2-G18-ER-ADM-17.01, Records Capture and Transmittal

3-21000-ADM-17.02, Administrative Records Screening and Processing.

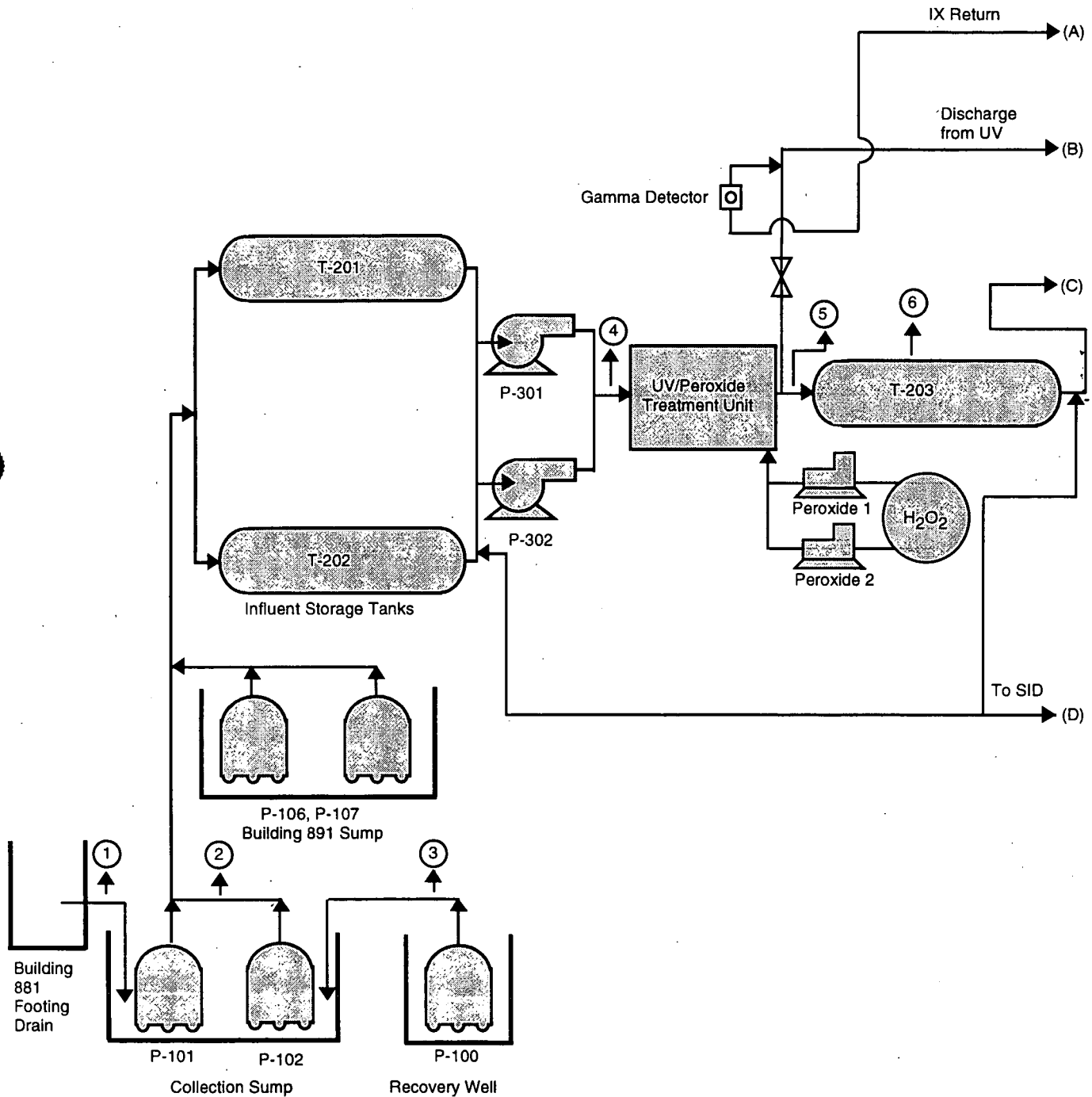
4-I50-ENV-OPS-FO.32, Treated Effluent Discharge, Operable Unit 1, Building 891

4-I54-ENV-OPS-FO.36, Ion Exchange System Regeneration Operations, Operable Unit 1, Building 891

APPENDIX 1

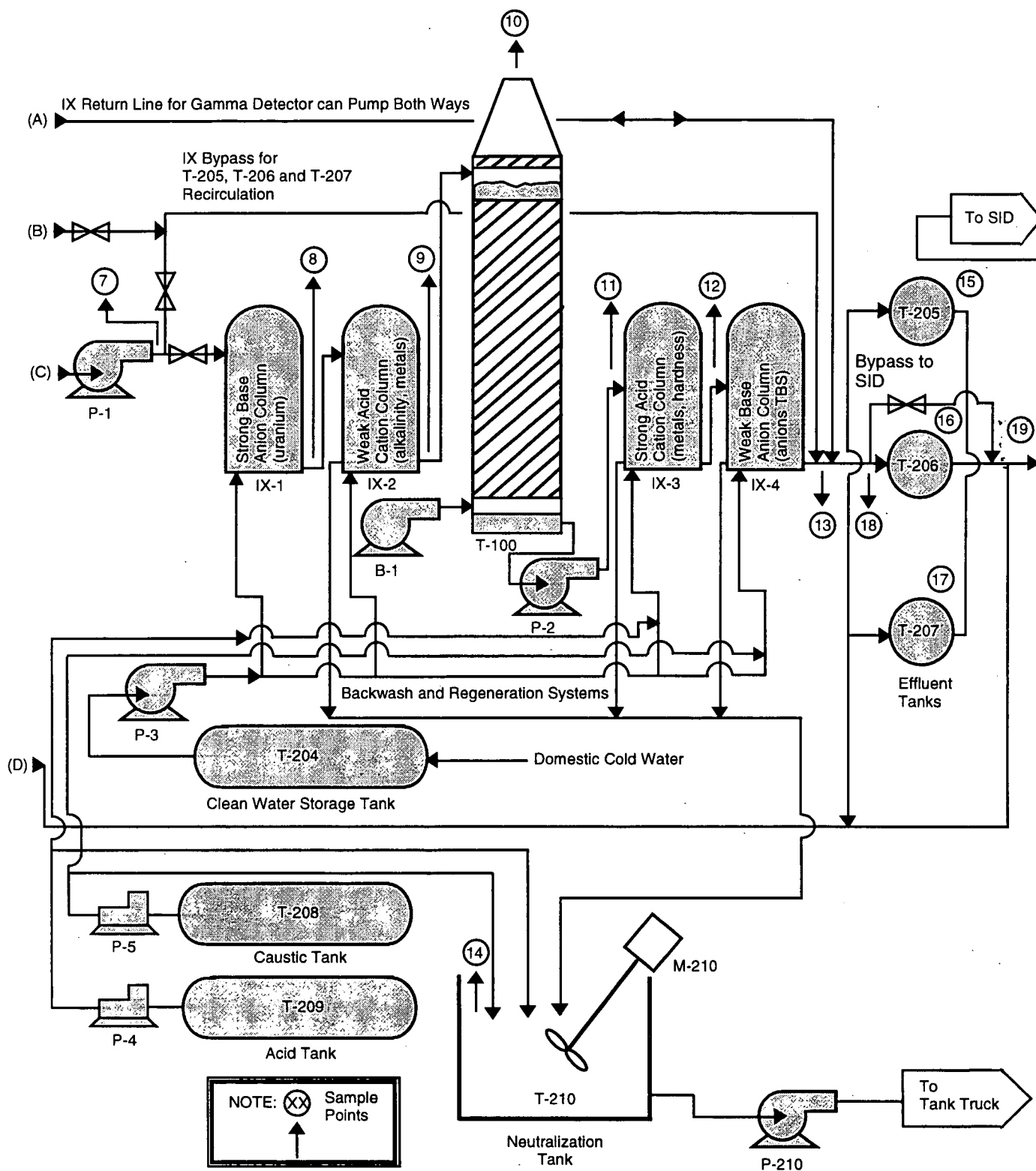
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GROUNDWATER RECOVERY/STORAGE DIAGRAM



APPENDIX 1

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APPENDIX 2

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ARAR LIMITS

METALS	TREATMENT REQUIREMENTS
Aluminum	5 mg/l
Antimony	0.06 mg/l
Arsenic	0.05 mg/l
Barium	1.0 mg/l
Beryllium	0.1 mg/l
Cadmium	0.01 mg/l
Cesium	NS
Chromium	0.05 mg/l
Copper	0.2 mg/l
Iron	0.3 mg/l
Lead	0.05 mg/l
Lithium	2.5 mg/l
Manganese	0.05 mg/l
Mercury	0.002 mg/l
Molybdenum	0.1 mg/l
Nickel	0.2 mg/l
Selenium	0.01 mg/l
Silver	0.05 mg/l
Strontium	NS
Thallium	0.01 mg/l
Vanadium	0.1 mg/l
Zinc	2.0 mg/l

NS = No Standard

APPENDIX 2

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MAJOR IONS	TREATMENT REQUIREMENTS
Methylene Chloride	5 ug/l
Acetone	50 ug/l
Carbon Disulfide	5 ug/l
1,1 Dichloroethene	7 ug/l
1,1 Dichloroethane	5 ug/l
1,2 Dichloroethane	5 ug/l
1,1,1 Trichloroethane	200 ug/l
Carbon Tetrachloride	5 ug/l
Trichloroethene	5 ug/l
1,1,2 Trichloroethane	5 ug/l
Tetrachloroethene	5 ug/l
Toluene	2000 ug/l
ORGANICS	
Calcium	NS
Magnesium	NS
Potassium	NS
Sodium	NS
Total Dissolved Solids	400 mg/l
Chloride	250 mg/l
Nitrite & Nitrate	10 mg/l
Sulfate	250 mg/l
Bicarbonate As (CaCO ₃)	NS
RADIONUCLIDES	
Gross Alpha	15 pCi/l
Gross Beta	50 pCi/l
Uranium (Total)	40 pCi/l
Strontium (89, 90)	8 pCi/l
Plutonium (239, 240)	15 pCi/l
Americium (241)	4 pCi/l
Tritium	20,000 pCi/l

NS = No Standard

APPENDIX 3

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VALVES

VALVE NO.	DESCRIPTION	TYPE
V-1	P-1 Service Inlet	2-in. Ball
V-2	P-1 Service Outlet	2-in. Ball
V-3	Bag Filter Outlet	2-in. Ball
V-4	IX-1 Inlet Isolation	1 1/2-in. Ball
V-5	IX-1 Outlet Isolation	1 1/2-in. Ball
V-6	IX-2 Inlet Isolation	1 1/2-in. Ball
V-7	IX-2 Outlet Isolation	1 1/2-in. Ball
V-8	Degasifier Inlet Isolation	1 1/2-in. Ball
V-9	Degasifier Outlet/P-2 Inlet	1 1/2-in. Ball
V-10	P-2 Outlet	1 1/2-in. Ball
V-11	IX-3 Inlet Isolation	1 1/2-in. Ball
V-12	IX-3 Outlet Isolation	1 1/2-in. Ball
V-13	IX-4 Inlet Isolation	1 1/2-in. Ball
V-14	UV #2 Sample Port	1/2-in. Ball
V-15	P-3 Inlet	2-in. Ball
V-16	P-3 Outlet	3-in. Ball
V-17	IX-2 Subsurface Backwash Inlet	2-in. Ball
V-18	IX-1 Subsurface Backwash Inlet	2-in. Ball
V-19	IX-3 Subsurface Backwash Inlet	2-in. Ball
V-20	IX-4 Subsurface Backwash Inlet	2-in. Ball
V-21	Bag Filter #2 Inlet	2-in. Ball
V-22	Bag Filter #2 Outlet	2-in. Ball
V-23	Caustic Makeup Water	1-in. Ball
V-24	Acid Makeup Water	1-in. Ball
V-25	P-5 to T-210 Influent	1 1/2-in. Ball
V-26	P-4 to T-210 Influent	1 1/2-in. Ball
V-27	P-5 Service Outlet	3/4-in. Ball
V-28	P-4 Service Outlet	3/4-in. Ball
V-29	P-5 Service Inlet	3/4-in. Ball
V-30	P-4 Service Inlet	1-in. Ball
V-31	T-208 Outlet	3/4-in. Ball
V-32	T-209 Outlet	1-in. Ball
V-33	BLR-2 Outlet	1 1/2-in. Ball
V-34	Degasifier Drain	1-in. Ball
V-35	Bag Filter 2 Drain	1/2-in. Ball

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VALVE NO.	DESCRIPTION	TYPE
V-36	Bag Filter 1 Drain	1/2-in. Ball
V-37	P-5 Caustic Sample Port	1/4-in. Ball
V-38	P-4 Acid Sample Port	1/4-in. Ball
V-39	IX-2 Effluent Sample Port	3/4-in. Ball
V-40	IX-1 Effluent Sample Port	3/4-in. Ball
V-41	IX-3 Sample Port	3/4-in. Ball
V-42	IX-4 Sample Port	3/4-in. Ball
V-43	IX-2 Vent	3/4-in. Ball
V-44	IX-1 Vent	3/4-in. Ball
V-45	IX-3 Vent	3/4-in. Ball
V-46	IX-4 Vent	3/4-in. Ball
V-47	IX-2 Acid Regenerant	1 1/2-in. Ball
V-48	IX-3 Acid Regenerant	1 1/2-in. Ball
V-49	IX-4 Caustic Regenerant	1 1/2-in. Ball
V-50	P-100 Outlet	1 1/2-in. Ball
V-51	P-101 Outlet	1-in. Ball
V-52	P-102 Outlet	1-in. Ball
V-53	Collection Gallery Filter Inlet	2-in. Ball
V-54	Collection Gallery Filter Bypass	2-in. Ball
V-55	Collection Gallery Filter Outlet	2-in. Ball
V-56	P-101, P102 Effluent	2-in. Ball
V-57	T-201, T-202 Influent	2-in. Ball
V-58	Domestic Influent Backflow Preventor	2-in. Ball
V-59	Domestic Influent Backflow Preventor	2-in. Ball
V-61	T-201 Secondary Containment Purge	2-in. Ball
V-62	T-202 Secondary Containment Purge	2-in. Ball
V-63	UV Influent T-201, T-202 Secondary Containment Purge	2-in. Ball
V-64	UV Influent T-201 Secondary Containment Purge	2-in. Ball
V-65	Caustic Dilution Water Flow Control	3/4-in. Gate
V-66	Acid Dilution Water Flow Control	3/4-in. Gate
V-67	Caustic Pressure	2-in. Ball
V-68	Acid Pressure	2-in. Ball
V-69	UV Effluent T-203 Secondary Containment Purge	2-in. Ball
V-70	T-204 Secondary Containment Purge	2-in. Ball
V-71	Chemical Metering Isolation	3/4-in. Ball
V-72	Chemical Metering Isolation	3/4-in. Ball
V-73	T-201 and T-202 Secondary Containment Purge	2-in. Ball

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VALVE NO.	DESCRIPTION	TYPE
V-74	UV Effluent Camlock	2-in. Ball
V-75	UV Basket Strainer Influent	2-in. Ball
V-76	Basket Strainer Camlock	2-in. Ball
V-77	P-301, P-302 Effluent Camlock	2-in. Ball
V-78	UV Influent Sample Port	1/2-in. Ball
V-79	UV #1 Effluent Sample Port	1/2-in. Ball
V-80	Gamma Detection Isolation	2-in. Ball
V-81	H ₂ O ₂ Tank Sample Port	1/2-in. Ball
V-82	H ₂ O ₂ Outlet	1/4-in. Ball
V-83	Chemical Metering Isolation	3/4-in. Ball
V-84	H ₂ O ₂ P-1 Influent	1/4-in. Ball
V-85	H ₂ O ₂ P-2 Influent	1/4-in. Ball
V-86	T-209 Influent Line Sample Port	1/4-in. Ball
V-87	T-208 Influent Line Sample Port	1/4-in. Ball
V-88	H ₂ O ₂ P-1 Effluent	1/4-in. Ball
V-89	Air Scour Unloader	1 1/2-in. Butterfly
V-90	H ₂ O ₂ P-2 Effluent	1/4-in. Ball
V-91	H ₂ O ₂ Splitter Pump Influent	1/2-in. Ball
V-92	Splitter Pump Purge	1/2-in. Ball
V-93	UV Chamber #1 Effluent Pressure	1/2-in. Ball
V-94	IX-4 Effluent	1 1/2-in. Ball
V-95	Plant Effluent	2-in. Ball
V-96	Plant Effluent Sample Port	1-in. Ball
V-97	T-210 Purge Port	1/2-in. Ball
V-98	T-210 Sightglass	2-in. Ball
V-99	P-210 Effluent Isolation	2-in. Ball
V-100	P-210 Discharge Isolation	2-in. Ball
V-101	T-210 Effluent Bypass	2-in. Ball
V-102	Influent Secondary Containment Purge	2-in. Ball
V-103	Truck Dock Influent	2-in. Ball
V-104	Truck Dock Influent Secondary Containment Purge	2-in. Ball
V-105	Influent Line Secondary Containment Purge	2-in. Ball
V-106	Effluent Tank Bypass (underground)	N/A
V-107	UV #1 Drain	1/2-in. Ball
V-108	Recirculation Isolation	2-in. Ball
V-109	UV #2 Drain	1/2-in. Ball
V-110	Makeup Water	2-in. Ball

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VALVE NO.	DESCRIPTION	TYPE
V-111	Inlet H ₂ O ₂ Rotameter 1	1/2-in. Gate
V-112	Inlet H ₂ O ₂ Rotameter 2	1/2-in. Gate
V-113	Inlet H ₂ O ₂ Rotameter 3	1/2-in. Gate
V-114	Outlet H ₂ O ₂ Rotameter 1	1/2-in. Ball
V-115	Outlet H ₂ O ₂ Rotameter 2	1/2-in. Ball
V-116	Outlet H ₂ O ₂ Rotameter 3	1/2-in. Ball
V-117	T-210 Recirculation Isolation	2-in. Ball
V-118	IX Feed Camlock	2-in. Ball
V-119	PSIG IX-1 Purge	1/4-in. Ball
V-120	PSIG IX-2 Purge	1/4-in. Ball
V-121	PSIG IX-2 Purge (no gauge)	1/4-in. Ball
V-122	PSID IX-2 Purge	1/4-in. Ball
V-123	PSID IX-3 Purge	1/4-in. Ball
V-124	PSIG IX-3 Purge	1/4-in. Ball
V-125	PSIG IX-4 Purge	1/4-in. Ball
V-126	PSIG UV #1	1/2-in. Ball
V-127	PSIG UV #2	1/2-in. Ball
V-128	Gamma Detection Isolation	2-in. Ball
V-129	Recirculation Purge	1-in. Ball
V-130	IX-2 Effluent Isolation	2-in. Ball
V-131	IX-4 Effluent Isolation	2-in. Ball
V-132	T-204 Clean Water Line Sample Port	1/4-in. Sample Cock
HV-107	Sump Pump Discharge	2-in. Ball
HV-108	Sump Pump Discharge	2-in. Ball
HV-500	Recirculation From Effluent Storage Tanks	2-in. Ball
HV-501	Recirculation to UV	2-in. Ball
HV-502	Recirculation to IX	2-in. Ball
HV-503	Recirculation	2-in. Ball
FV-7	Dilute Acid for T-210 Neutralization	1 1/2-in. Auto
FV-9	Acid Regenerant	1 1/2-in. Auto
FV-17	Dilute Caustic for T-210 Neutralization	1 1/2-in. Auto
FV-19	Caustic Regenerant	1 1/2-in. Auto
FV-1A	IX-1 Service Inlet	1 1/2-in. Auto
FV-2A	IX-1 Backwash Inlet	1 1/2-in. Auto
FV-5A	IX-4 Backwash Outlet	1 1/2-in. Auto
FV-8A	IX-1 Fast Rinse Inlet	2-in. Auto

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VALVE NO.	DESCRIPTION	TYPE
FV-10A	IX-1 Fast Rinse Outlet	2-in. Auto
FV-11A	IX-1 Air Scour Inlet	1 1/2-in. Auto
FV-12A	IX-1 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13A	IX-1 Air Scour Outlet	1-in. Auto
FV-1B	IX-1 Outlet/IX-2 Service Inlet	1 1/2-in. Auto
FV-2B	IX-2 Backwash Inlet	1 1/2-in. Auto
FV-3B	IX-2 Acid Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-4B	IX-2 Outlet	1 1/2-in. Auto
FV-5B	IX-2 Backwash Outlet	1 1/2-in. Auto
FV-6B	IX-2 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8B	IX-2 Fast Rinse Inlet	2-in. Auto
FV-10B	IX-2 Fast Rinse Outlet	2-in. Auto
FV-11B	IX-2 Air Scour Inlet	1 1/2-in. Auto
FV-12B	IX-2 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13B	IX- Air Scour Outlet	1-in. Auto
FV-1C	IX-2 Service Outlet/IX-3 Service Inlet	1 1/2-in. Auto
FV-2C	IX-3 Backwash Inlet	1 1/2-in. Auto
FV-3C	IX-3 Acid Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-5C	IX-3 Backwash Outlet	1 1/2-in. Auto
FV-6C	IX-3 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8C	IX-3 Fast Rinse Inlet	2-in. Auto
FV-10C	IX-3 Fast Rinse Outlet	2-in. Auto
FV-11C	IX-3 Air Scour Inlet	1 1/2-in. Auto
FV-12C	IX-3 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13C	IX-3 Air Scour Outlet	1-in. Auto
FV-1D	IX-3 Service Outlet/IX-4 Service Inlet	1 1/2-in. Auto
FV-2D	IX-4 Backwash Inlet	1 1/2-in. Auto
FV-3D	IX-4 Caustic Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-4D	IX-4 Service Outlet	1 1/2-in. Auto
FV-5D	IX-4 Backwash Outlet	1 1/2-in. Auto
FV-6D	IX-4 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8D	IX-4 Fast Rinse Inlet	2-in. Auto
FV-10D	IX-4 Fast Rinse Outlet	2-in. Auto
FV-11D	IX-4 Air Scour Inlet	1 1/2-in. Auto
FV-12D	IX-4 Subsurface Wash Inlet	1 1/2-in. Auto

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VALVE NO.	DESCRIPTION	TYPE
FV-13D	IX-4 Air Scour Outlet	1-in. Auto
HVA-201	Influent from French Drain to T-201	2-in. Ball
HVB-201	Effluent From T-201	2-in. Ball
HVA-202	Influent from French Drain to T-202	2-in. Ball
HVB-202	Effluent From T-202	2-in. Ball
HVA-203	UV Effluent to T-203	2-in. Ball
HVB-203	IX Feed From T-203	2-in. Ball
HVA-204	Regenerant Effluent to T-204	2-in. Ball
HVB-204	Regeneration Clean Water From RFP	2-in. Ball
HVC-204	Regeneration Clean Water to P-3	2-in. Ball
HVA-205	Plant Effluent/T-205 Influent	2-in. Ball
HVB-205	T-205 Discharge	4-in. Butterfly
HVC-205	T-205 Recirculation	4-in. Butterfly
HVA-206	Plant Effluent/T-206 Influent	2-in. Ball
HVB-206	T-206 Discharge	4-in. Butterfly
HVC-206	T-206 Recirculation	4-in. Butterfly
HVA-207	Plant Effluent/T-207 Influent	2-in. Ball
HVB-207	T-207 Discharge	4-in. Butterfly
HVC-207	T-207 Recirculation	4-in. Butterfly
HVD-207	T-207 Isolation	2-in. Ball
HVA-208	Caustic Inlet-Truck Dock	2-in. Ball
HVB-208	Caustic Outlet-T-208	2-in. Ball
HVA-209	Acid Inlet-Truck Dock	2-in. Ball
HVB-209	Acid Outlet-T-209	2-in. Ball
HVA-210	P-210 Inlet	2-in. Ball
HVB-210	P-210 Outlet	2-in. Ball
HVC-210	Discharge Camlock	2-in. Ball
HVD-210	Discharge Truck Dock	2-in. Ball
HVA-301	P-301 Inlet	2-in. Ball
HVB-301	P-301 Outlet	2-in. Ball
HVA-302	P-302 Inlet	2-in. Ball
HVB-302	P-302 Outlet	2-in. Ball
FCV-1	Fail Close Plant Effluent	1 1/2-in. Solenoid
FCV-2	Fail Close Recycle	2-in. Diaphragm
FCV-3	Collection Gallery Flow Control	2-in. Diaphragm
FCV-4	UV Effluent Control	1 1/2-in. Ball

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